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ABSTRACT

This cooperative learning activity, for grades 7-12, promotes critical thinking skills within the context of learning about the causes and effects of climate change. Objectives include: (1) understanding factors that reduce greenhouse gases; (2) understanding the role of trees in reducing greenhouse gases; (3) identifying foods that produce greenhouse gases; (4) realizing the importance of personal responsibility to recycle; and (5) understanding the importance of being a responsible consumer. (CCM)

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A Lesson on Climate Change

Target Audience:

7th - 12th Grades
Environmental Studies (Biology/Life Sciences)

Introductory information:

This cooperative learning activity promotes critical thinking skills. Under a timed setting, students are expected to synthesize or express concepts towards solving the question posed at each lab station.



After all lab teams have passed through the lab stations, the teacher facilitates a class discussion on teams' responses to each station. Students should have reading material on the causes and effects of climate change, or should have devoted one or more class periods to discuss the subject. (See bibliography of reading materials and list of sites on the internet's World Wide Web.)

Class time: 45 minutes

Objectives: Students will:

- ✗ Understand that conservation of electricity, water, oil, and other resources reduces greenhouse gases.
- ✗ Understand the role of trees planted in their yard as a step toward reducing greenhouse gases.
- ✗ Identify foods that are energy costly and thus produce more greenhouse gases.
- ✗ Realize the importance of each individual taking the responsibility to recycle and that the concerted efforts of individuals do make a difference.
- ✗ Understand the importance of becoming a responsible consumer with regard to curbing the threat to global climate change.

Materials:

Run off copies of the text for each lab station.

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Paste each copy to either a manila folder or poster board folded in half to make a station card which stands vertically.

Obtain the appropriate materials for each station:

- ✗ **Station 1** - a potted plant or tree.
- ✗ **Station 2** - an "On/Off" shower head connector or a low-flow shower head.
- ✗ **Station 3** - a compact fluorescent light bulb.
- ✗ **Station 4** - a bucket filled with recyclables.
- ✗ **Station 5** - reusable lunch and shopping bags.
- ✗ **Station 6** - a plastic and paper bag from the grocery store.
- ✗ **Station 7** - spark plug.
- ✗ **Station 8** - magazine photo of cow, beefsteak.
- ✗ **Station 9** - two bowls of fruit.
- ✗ **Station 10** - light switch.

(Also See Suggestion for Extension and Integration at the end of the activity.)

Procedures:

Divide the class by the number of stations to create your cooperative learning teams. Each team will decide who will record the team's responses to each station.

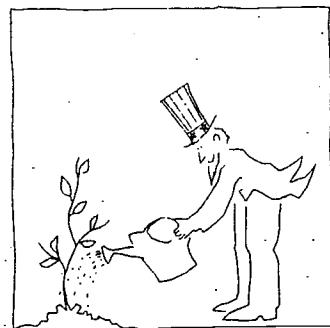
Explain to the class that they will have two minutes at each station. At the end of the two-minute period, the teacher will say **Stop** (or blow a whistle) and say, **Go to the next station**. Students will have five seconds to get to the next station.

Explain to the class that after all teams have gone through the stations, the class will sit with their team members and the teacher will facilitate a class discussion, soliciting teams' responses for sound, practical responses.

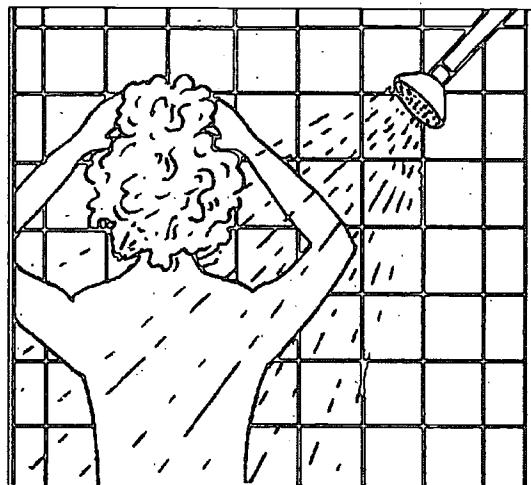
Below are the cards for each lab station:

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Station 1: "By taking responsibility and planting trees in your yard and your community, how will you help curb the threat of global climate change? List at least two ways."

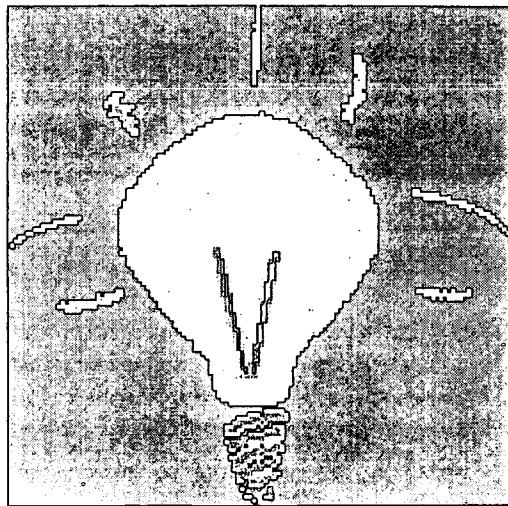


Station 2: "By installing this device, how might you help curb the threat of global climate change? List at least three ways."

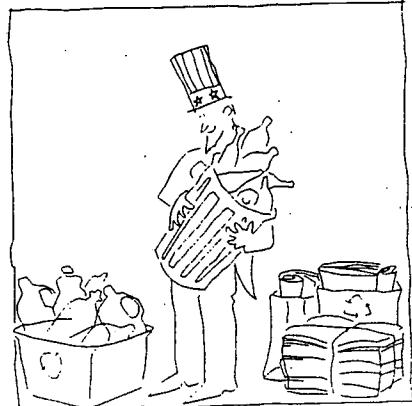


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Station 3: "This compact fluorescent light runs on a fraction of the electricity that it takes to run the typical incandescent light bulb at right. And, it lasts longer. With your use of these compact fluorescent lights in your home, how might you be taking a step towards easing the threat of global climate change? List at least two ways. Is there another valid reason to use these? (Note: The last answer does not necessarily have to relate to climate change.)"

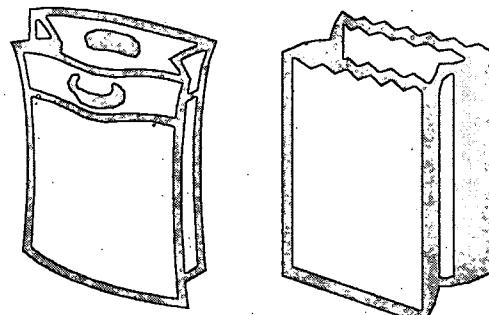


Station 4: "How does your effort to recycle in your daily life help ease the threat of global climate change? List at least two ways."



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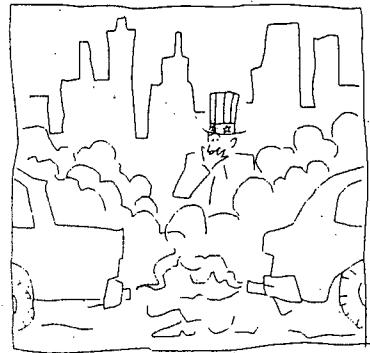
Station 5: "How does regular use of reusable lunch or shopping bags help curb the threat of global climate change? List at least two ways."



Station 6: "Paper or plastic or...? Keeping in mind what you have learned about global climate change, what is ultimately the best response to give the store clerk?"

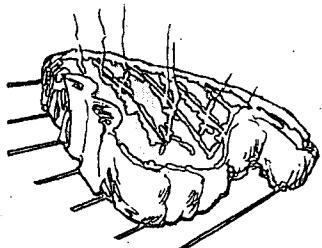


Station 7: "How might your keeping the car tuned regularly be a responsible step towards curbing the threat of global climate change? List at least two ways."

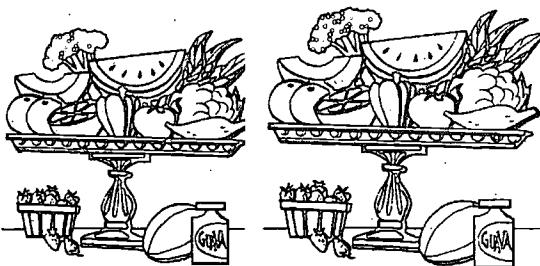


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Station 8: "How might your reduction in consumption of beef be a responsible step in helping to reduce the threat of global climate change? List at least four ways."

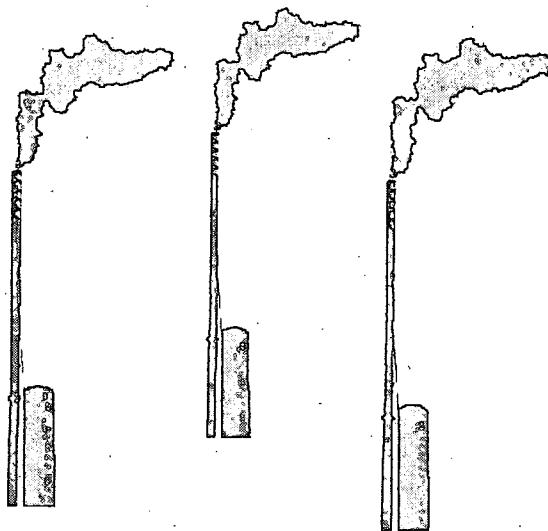


Station 9: "Love fruit? So do I. The fruit in the left tray were grown in our state. However, the fruit in the right tray were grown in a foreign country and can be purchased in our stores seasonally. Which fruit should you buy to help curb the threat of global climate change? List at least two reasons."



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Station 10: "How might remembering to always turn the lights off when leaving a room be a step towards curbing global climate change? List at least two ways."



Teacher answer key - Possible Team Responses To Each Station.

(Students may think of others.)

Station 1: (Planting Trees)

- * Sink for Carbon dioxide.
- * Shading the house -- uses less electricity (and therefore emissions) by not using the air conditioner.
- * They are a wind barrier in winter, requires less heating (and therefore emissions) in the house.

Station 2: (Installing "On/Off" shower head connector)

- * Uses less gas or electricity to heat water (thus reducing greenhouse emissions)
- * Uses less water (takes less electricity or other fossil fuels to pump water to communities).
- * By using less water, have more water for your trees!

Station 3: (Compact fluorescent lights)

- * Uses less electricity (reduces greenhouse emissions).
- * Equaled to 10 light bulbs thus uses less resources (this reduces emissions).

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- * Will not have to go to the store as often to buy lights (reduces emissions).
- * Extra answer: They cost more to buy, but less to operate. In the long run, they save users money.

Station 4: (Recycling)

- * Uses less resources (reduces emissions).
- * Uses less energy for manufacturing (reduces emissions).

Station 5: (Reusable lunch/shopping bags)

- * Saves trees (more sinks for emissions).
- * Saves resources (reduces emissions).
- * Reduces transportation of garbage to landfills (reduces emissions).

Station 6: (Paper or Plastic or...?)

- * (see Station 5, above).

Station 7: (Keeping Car tuned regularly).

- * Use less gas (reduces emissions).
- * Life of car is extended (saves resources and energy -- reduces emissions).

Station 8: (Reduction in beef consumption)

- * Fewer cows become processed beef to be transported (reduces emissions).
- * Fewer cows -- less methane production (a greenhouse gas).
- * Less packaging, less energy (reduces emissions).
- * Less electricity due to reduced refrigeration costs (reduces emissions).

Station 9: (Fruit -- Buy in our state or foreign country?)

- * Buying in-state reduces transportation, thus energy (reduces emissions).
- * Less wear of materials from vehicles involved in transporting (conserves resources and energy -- thus reduces emissions).

Station 10: (Remembering to turn off lights in rooms)

- *Saves electricity (reduces emissions).
- *Saves light bulbs -- takes energy to manufacture them (reduces emissions).
- *Saves trips to the store to buy bulbs (reduces emissions).
- *Saves packaging of the bulbs (reduces energy, thus emissions).
- *CO₂ emissions from the father yelling always to "TURN OFF THE LIGHTS!"

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Suggestions for extensions and integration:

- * You may wish to add or substitute stations that reflect the demographics and particular environmental concerns of your community.
- * As a follow up activity you may wish to have each team come up with one or more of their own stations.
- * As a homework assignment, students may write an oath that they will take regarding their efforts around their home to curb the threat to global climate change.
- * As a homework assignment, students could research and disclose which cultures would not be affected by specific lab stations encountered in today's lab.

Bibliography

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Global Climate Change and Florida. Environmental Education Leaflet #8, Florida Department of Environmental Protection. 1998.

The Coming Climate, Scientific American. May 1997.

The Rising Seas, Scientific American, March 1997.

Our Changing Climate -- Reports to the Nation on Our Changing Planet. UCAR Joint Office for Science Support and National Oceanographic and Atmospheric Administration. Fall 1997. (See also: <http://www.ogp.noaa.gov/OGPFront/Edoutrch.html>)

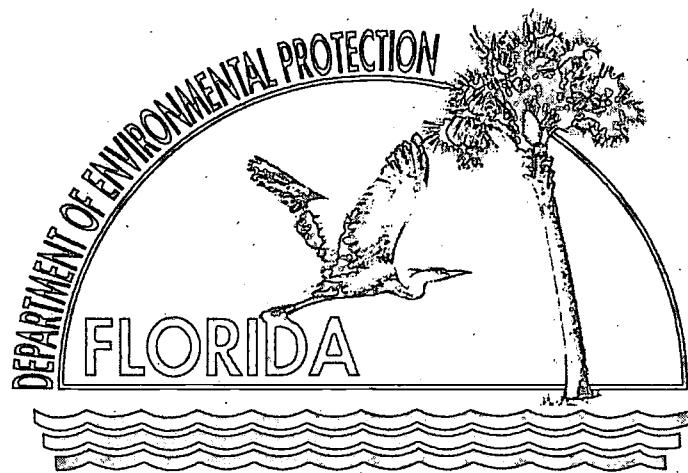
Sites on the World Wide Web:

- * NOAA/Office of Global Programs: <http://www.ogp.noaa.gov>. Information on NOAA-sponsored research.
- * The U.S. Global Change Research Information Office: <http://www.gcrio.org/>.
- * Information Unit of Climate Change, United Nations Environment Program: http://lacebark.ntu.edu.au/j_mitroy/sid101/uncc/fs-index.html. Contains more than 90 fact sheets on all aspects of climate change.
- * Global Change Master Directory: <http://gcmd.gsfc.nasa.gov/>.

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